

**ABSTRACT**

1 The present invention provides a highly  
glycosylated iduronate-2-sulfatase enzyme comprising an  
iduronate-2-sulfatase polypeptide with at least 5  
kilodalton (kDa) more sugar than iduronate-2-sulfatase  
5 purified from a natural source, e.g. human liver. The  
present invention also provides an enzymatically active  
polypeptide fragment or variant of such a highly  
glycosylated iduronate-2-sulfatase. The present  
invention further provides an isolated nucleic acid  
10 encoding iduronate-2-sulfatase, as well as an expression  
vector, a host cell and a method for producing the  
present highly glycosylated iduronate-2-sulfatase  
enzyme. In one embodiment the present invention is  
directed to a method for producing a glycosylated  
15 iduronate-2-sulfatase enzyme which comprises culturing a  
host cell containing a nucleic acid encoding an  
enzymatically active iduronate-2-sulfatase polypeptide  
wherein the host cell glycosylates the polypeptide to a  
greater degree than a native iduronate-2-sulfatase  
20 polypeptide expressed by a natural human liver cell.

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